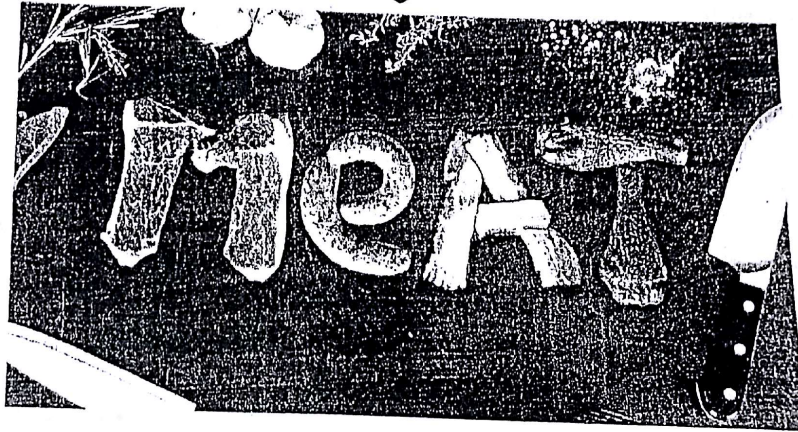


Meat Hygiene

Abnormal and pathological conditions related to meat inspection

1

لحم الخنزير لاول ١٥٠



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5. Imperfect bleeding

(Insufficiency of bleeding)

Postmortem findings:

1. The flesh → dark red in color and flabby.
2. The organs (particularly liver, lungs, spleen and kidneys) → congested and dark red in color and when cut, blood runs out.
3. The intercostal veins → full of blood and are clearly visible.
4. Left ventricle of heart → full of blood and contains large mass of clotted blood.
5. Ln → dark red in color as if soaked in blood but not enlarged.
6. Cut in the axillary space to expose axillary blood vessels (May's test) → reveal engorgement of blood vessels with blood.
7. The carcass sets badly and decomposes rapidly.

Judgment:

→ Total condemnation

→ In borderline cases, where the blood is partially removed from the carcass and carcass moderately sets → it may be passed for rapid consumption.

6. Pale muscular tissue (Myopathies)

Causes:

1. Congenital myopathy.
2. Nutritional myopathy → due to ↓ vitamin E and se e.g. nutritional muscular dystrophy in calves and stiff lamb disease.
3. Toxic myopathy.
4. Ischemic myopathy.
5. Nerve damage or paralysis → as occurs in the wasting and atrophy of the shoulder and foreleg muscles of cattle and sheep suffering from radial nerve paralysis.

Postmortem findings:

1. Presence of discrete greyish to white streaks or foci in the heart and skeletal muscles.
2. The lesion is usually dry and has the appearance of fish flesh.
3. The lesions of skeletal muscles → bilaterally symmetric.
4. If the heart is severely affected → pulmonary oedema, congestion and hydrothorax.

Judgment:

depends on the extent of muscular changes and condition of the carcass:

- 1- In severe cases, or if there are systemic changes → they are unfit for human consumption.
- 2- In mild cases (Localized lesions) → the carcass passes for human consumption after removal of the affected tissue.

7. Estrus

Definition:

The excitement of estrus in cattle, especially heifers, may produce unfavorable changes in the carcass such as imperfect bleeding.

Judgment: Depends on the condition of carcass.

8. Advanced pregnancy and recent parturition or abortion

Advanced pregnancy

Definition:

• In Egypt:

Economically, it is forbidden to slaughter females and subsequent pregnant animals except in cases of emergency. Slaughtering of an animal in advanced pregnancy is prohibited for avoiding fetus loss and inferior meat quality.

Postmortem findings:

1. Enlarged uterus with alive or dead fetus.
2. The flesh especially that of the hindquarters → molter than normal and flabby in texture.
3. The liver → physiological fatty change.
4. The odor of acetone can be recognized in meat by Rothera's and boiling tests.

Judgment:

- If there are no abnormalities → the carcass passes as inferior quality.
- If the fetus has died in uterus and putrefactive changes are present → the carcasses should be condemned.

Recent parturition or Abortion

Slaughtering of such cases should be delayed for 10–14 days at least after parturition or abortion until the animal restores its normal condition.

Judgment:

- The judgment depends upon:
 - Presence or absence of disease.
 - Presence or absence of abnormal odor.
 - Positive or negative bacteriological and residue tests.
- Carcasses in a good condition with the absence of disease and abnormal odor as well as having negative bacteriological and residue tests → passed for human consumption; otherwise, subjected to heat treatment or totally condemned.

9. Dead animal (Cold slaughtering)

Definition:

Slaughtering of a dead animal may be encountered in the emergency-slaughtered cases before its admittance to the abattoir.

Differentiation between vital and cold slaughtering is very important.

Item	Vital slaughtering	Cold slaughtering
Slaughtering cut edges	Never coaptate together	Easily coaptate together.
Slaughtering site	• Impregnated with blood and not easily washed with water. • Presence of inflammatory reaction.	• Not impregnated with blood, and if present it is easily washed with water. Absence of inflammatory reaction.
On opening the abdominal cavity	Normal odor and color of the viscera.	Offensive odor, greenish coloration of the abdominal wall, kidneys and fat.
Bleeding efficiency	Well-bled meat.	Apparent signs of imperfect bleeding.

Judgment:

Dead animals should not be eviscerated → Total condemnation.

10. Fecal contamination

Definition:

- Physical contamination of the carcass or organs by stomach or intestinal contents → caused by damage to the stomach or intestinal tract during the slaughter and dressing of the animal.
- It is a significant route of transmission for food poisoning organisms such as *Campylobacter*, *Salmonella* and *Escherichia coli*.

Judgment: Trim and condemn the affected parts.

11. Bruising, wounds and fractures

Definition:

• In cattle, caused by

- 1- undue transportation
- 2- rough handling
- 3- fighting between animals especially horned ones

• commonly found in the hip, chest and shoulder areas and in sheep in the hind leg.

Judgment:

Dependent on the extent and severity of the bruising.

- Affected parts are condemned, but if associated with systemic disturbance → total condemnation
- Fracture accompanied with suppurative or gangrene → total condemnation of the carcass.
- If there is extensive and severe bruising → total condemnation, otherwise condemn the affected parts.
- Carcasses affected with local bruising are approved after being trimmed.

12. Abnormal odors and tastes of meat

Definition:

apparent immediately after slaughter.

1. Diet → e.g. fish meals.
2. Drugs → e.g. linseed oil, turpentine, ether, chloroform, aromatic spirits of ammonia, etc
3. Absorption of the odor of strong-smelling substances whilst meat is stored → e.g. refrigerated meat during transport can absorb various smells such as the odor of over-ripe oranges or citrus fruit.

4. Sexual odor:

- noticed in mature boars and male deers in rut → due to the presence of androsterone in the fat.
- Boar salivary glands when boiled in water → give off a musty smell.
- The flesh of buck goats → unpleasant smell similar to that from their skin.

5. Acetonemia or ketosis → metabolic disease occurring in cows shortly after calving.

- Flesh → has a peculiar sweet smell due to presence of acetone in the tissues → easily detected from the freshly cut surface.
- The odor remains even after cooking.
- The liver → fatty with a strong smell of acetone.
- Rothera's test → used for detection of acetone in meat.

6. Specific disease e.g. blackquarter → causes a cheesy smell.

7. Abscesses → have a nasty smell in pigs, especially if fat is affected.

8. Gangrene.

9. Putrefaction.

Judgment:

- Pronounced odour → total condemnation as most odors become more pronounced on cooking.

- Boiling and Roasting tests → take a piece of meat (24 hours after slaughter) → either boil in water or fry.

10. Bone taint:

The main cause → improper cooling of the carcass, especially in hot weather → associated with the growth of putrefactive anaerobic bacteria (*Clostridium perfringens* and *Cl. Putrefaciens*) → giving a very typical smell to the musculature.

- The putrefaction starts in the marrow or synovial fluid which enhances growth of bacteria by its alkaline pH.

- The muscle → may retain its normal color but may change to green and almost black.

- Occurs in the region of the hip joint in large hindquarters.
- Common in imported hindquarters.

Judgment:

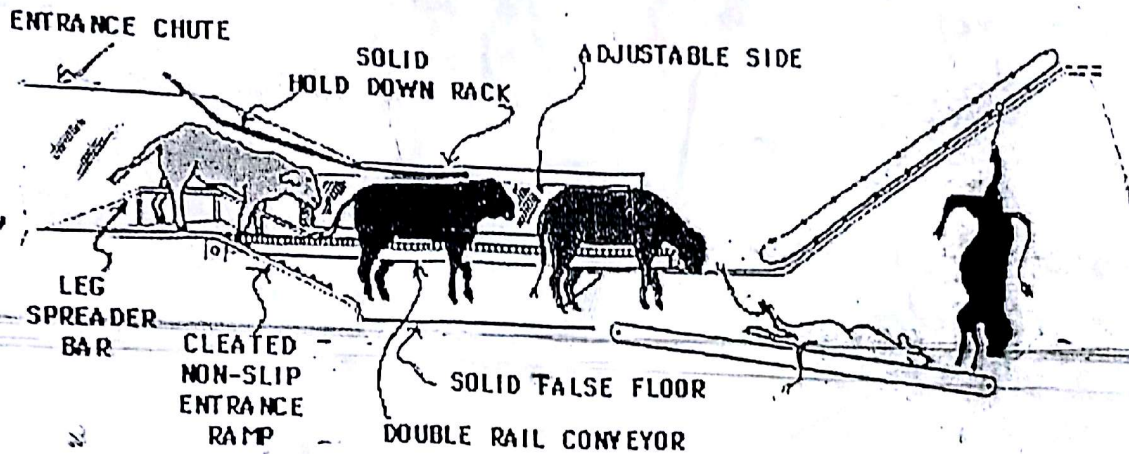
Bone taint is a local condition requiring condemnation of affected parts.

Meat Hygiene

مطابق
استاندارد
ایزو ۲۲۰۰۰

Abattoir (Slaughterhouse)

1



أ.د/ خالد سلام

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These must be on the clean side, preferably at the highest point.

3- Separation of the "clean" and "dirty" areas of the premises → Vehicles which offload live animal, loads intestines, heads and feet as well as vehicles removing paunch contents and condemned material are restricted to the dirty area and not enter areas where meat vehicles and staff who handle meat are found.

4- Surfaces on the site must be paved or grassed.

5- all paved areas must provide for storm water drainage.

6- Walkways for staff between the ablation block and the abattoir must be roofed.

7- Specific areas such as collection points for manure from holding pens and paunch contents must be paved and drained.

6. Abattoir work area:

general guidelines should be considered in designing abattoir work area:

- ① During processing, product flow must be from dirtier to cleaner areas, zones or rooms.
- ② drainage must be from clean to dirty.
- ③ airflow must be from clean to dirty.

- ④ product Flow Lines must not cross.
- ⑤ Backtracking must be avoided.
- ⑥ products derived from slaughtering and dressing must be removed from the slaughter area as quickly as possible.
- ⑦ Heads and skins must not be carried or passed under or around dressed carcasses on route to the exit point.
- ⑧ "Warm" and "Cold" working areas must be distinguished.
- ⑨ staff must take the shortest routes when moving to their workstations.
- ⑩ Hand Washbasins:
 - must be accessible to all workers
 - at distance not exceed 3 meters from any workstation which handle products.
 - at raised platforms
 - Taps operated with the foot or knee.

C. Facilities for staff:

- ^{عزق بالحيز} Cloakroom facilities, toilets, showers and dining room facilities sufficient for the number of workers.
- total separation between cloakroom/shower and toilet/urinal areas.
- Hand wash with taps controlled by foot or knee.

⑥

The intensity of Light should be measured at 0.9 - 1.5 m height and should not be less than 540 Lux (50 foot Candles) at all inspection point

- 220 Lux (20 foot Candles) in Work rooms
- 110 Lux (10 foot Candles) in other areas

⑦ ventilation:

- Ventilation prevents the accumulation of odors, dust, excessive heat, steam and Condensation.
- ^{200 file} screened windows and open ventilators are provided to avoid flies.

The airflow and the prevailing winds must blow from the "clean" side to the "dirty" side.

8) Floors and walls:

FLoorS:

- made of hard, impervious, washable, non-toxic and non-slip materials.
- Can be easily cleaned and disinfected.
- With sufficient slope to drain liquid to trapped outlets.

Walls:

should be faced with smooth, hard, impervious and easily cleaned and disinfected materials up to a height of not less than 3 m from the floor and preferably reach the ceiling (smooth, hard and impervious)

9 Roofs or Ceilings :

- A roof should be provided for :
 - 1- shade
 - 2- making slaughtering independent of weather.
- Roofs should be adopted to ensure adequate ventilation.
- Ceiling → Constructed to prevent accumulation of dirt and mould development.
→ should be easily cleaned.

10 Drainage :

Traditional abattoirs

- a slope is made to the floor in the direction of gutters for adequate drainage.
- Non-Covered drainage system.

دفع باجزر
بجاء بركة فقا من اجزور

Modern abattoirs

- More complicated system of drainage.
- under pressure for rapid elimination of waste material and water by transferring them to the effluent treatment unit to ensure maximum prevention of environment pollution.

11 Abattoir Layout and Construction:

abattoir has 2 main areas

"Dirty" area

• receive Live Slaughter animals

• Includes:

1. Livestock entrance
2. Vehicle Wash bay
3. offLoading platform's
4. Lairage
5. antemortem inspection area
6. Isolation Lairage
7. Emergency slaughter facilities for hurt animals
8. PM inspection area
9. stunning area
10. bleeding area
11. area for electrical stimulation of ruminant CarCasses.
12. Condemned meat room
13. Inedible area
14. area for sorting, grading and Weigh of Live animals.

"Clean" area

• Meat is outLoaded from the clean side.

• Includes:

1. Slaughter hall
2. Inspection area of the CarCass.
3. retention area for secondary inspection of suspected CarCasses.
4. grading and Weighing of CarCasses.
5. chilling room
6. Freezer facilities
7. Sorting and Loading of CarCasses in a cooled area
8. Dispatch facilities
9. Washing bay for meat truck
10. office for meat inspectors
11. office for management.
12. Laundry facilities
13. Laboratories
14. store rooms

- 15 - Room for cleaning and processing of rough offal
- 16 - Disposal of solid waste as intestinal contents
- 17 - area where rough offal is packed and cartoned.
- 18 - chiller or freezer facilities for rough offal
- 19 - Dispatch area for rough offal.
- 20 - Effluent pre-purification plant and holding tanks
- 21 - Facilities for the processing of condemned products.
- 22 - store rooms for dirty area
- 23 - Cloakrooms, toilets, showers, washing facilities and dining room where only workers of the dirty areas have access

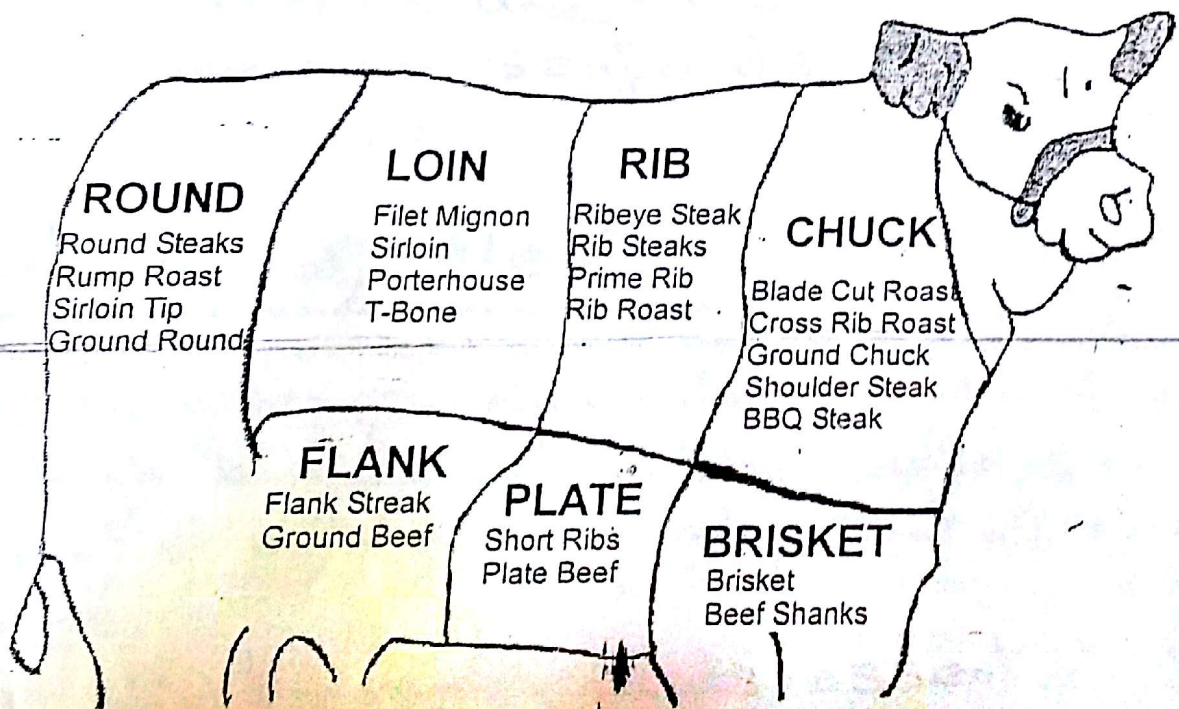
15 - cloakrooms, toilets, showers, wash facilities and dining room where only workers in the clean area have access.

Meat Hygiene

Introduction

Postmortem Inspection

(1)



أ.د/محمد الجزار

By Dr. M. Abdelnaeem

- ⑤ audio Link with a central recording office is the best system for recording diseases data.
- have disease data which are confirmed and documented.
 - So, PM inspection help in disease control.

procedure of postmortem inspection

① postmortem inspection involves:

a. Sensory evaluation:

1. Visual examination:

e.g. Liver has a reddish brown colour but in case of pathological fatty change, it has clay colour.

2. palpation of tissues and organs:

- deep palpation to detect presence of swelling.
- hand washing facilities must be provided.

- Incisions (where necessary):

must only be done where necessary → avoid unnecessary cuts.

Inspector's knife must be pointed → for enucleation (as caseated or calcified lesion).
Inspector must have 2 or more knives.

contaminated. Knife should be discarded for sterilization and a clean knife used.

③ prior to the completion of p.m. inspection: Serous membranes, evidence of disease, identification mark and any other part must not be changed or removed from the carcass.

→ Tuberculous Lesions on Serous membranes (pleura, peritoneum, pericardium), in organs (esp. in parenchymatous organs) or Ln should not be removed or changed till complete p.m. inspection.

④ Before the day's slaughter starts

The inspector must ensure that:

- the premises, equipment and mechanical facilities are hygienic and in good working order.
- Meat operatives are properly clothed and adequate in number.

⑤ The meat inspection staff stamp the carcass and its viscera either as passed or condemned and ensure the proper disposal of the condemned carcasses.

- 8) The final judgement of the Carcass and offal fitness for human Consumption is decided by the veterinary inspector who must have the authority to stop slaughter and dressing operations because of:
- Lack of hygienic measures
 - defective dressing techniques (during skinning and evisceration)
 - Lack of requirements of animal Welfare
 - Inadequate meat inspection.

N.B:

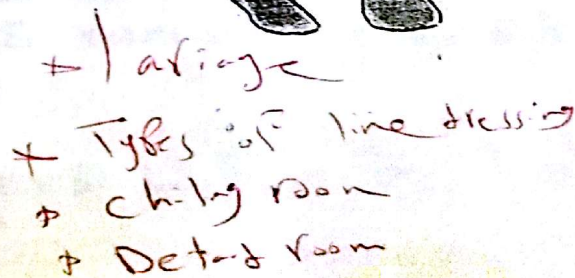
There are 4 parameters For good Carcass:

- 1) efficient bleeding
- 2) good setting
- 3) No abnormal color
- 4) No abnormal odor

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9

Abattoir
(Slaughterhouse)



wikiHow

بسم الله الرحمن الرحيم

- None of the stunning methods can be assumed to have killed the animal.
- Sticking should occur within 15 seconds of stunning.
- About 40-60% of the total blood volume is evacuated during bleeding of the animal. The remainder is largely retained in the viscera. Only about 3-5% remains in the muscles.

Kinds of slaughter hall

Traditional (old fashioned) slaughter halls

Considered unhygienic (high microbial contamination) in slaughtering, dressing, evisceration, splitting and inspection of all carcasses.

Modern automatic slaughter halls

are highly sophisticated dressing lines known as on-the-rail dressing.

دھیر لڑیا تیج علاقہ داسیر
تقسیم

or - 66.821 2000

On-the-rail dressing system

- after stunning (except in the case of the Jewish and Muslim methods) → the animals are shackled by a hind leg and lifted by means either a hoist or elevator onto an overhead rail before being bled.

• Without the Line method of slaughter, it would be impossible to reach the high production achieved in modern abattoirs which may be as high as 5000 cattle, 10000 sheep and 1000 pigs every 10 hrs.

• The Line system does raise the problem of identifying offal's with carcasses unless the offal's move along with the carcasses.

• Recommended Rail heights :

Species	Bleeding (minimum distance from top of rail to floor)	dressing (minimum distance from top of rail to floor)
Cattle	3.7 m	3.1 m
calves	3.7 m	2.4 m (or above level of inspection platform)
sheep and goats	2.4 m	2.0 m (or above level of inspection platform)

Types of Line dressing for cattle: "on-the-rail" dressing system

- ① Gravity rail system (GRS)
- ② Intermittent powered rail system (IRS)
- ③ Continuous powered rail system (CRS)
- ④ Canpak system (CS)

Sequence of Slaughter and dressing processes of cattle on a modern line system:

- ① drive, pen cattle and stunning.
- ② Shackling and hoisting
- ③ Bleeding / sticking
- ④ Weasand rodding (separating the trachea from the oesophagus)
- ⑤ Removal of front leg
- ⑥ Skinning of first hind leg.
- ⑦ Removal of first hind leg.
- ⑧ Skinning of second hind leg.
- ⑨ Removal of the second hind leg.
- ⑩ Skinning of belly / flank.
- ⑪ Skinning of lumbar region and back.
- ⑫ Neck, shoulders and chest skinning.
- ⑬ Final hide removal by operating hide puller.
- ⑭ Removal and hanging of the head, drop the tongue, wash the head.
- ⑮ Splitting of the breastbone with a hand knife, split the cartilage and breastbone with a breastbone saw or hand saw.
- ⑯ Evisceration of the abdomen and remove caul fat.
- ⑰ Evisceration of the thorax
- ⑱ Removal of the pluck.
- ⑲ Splitting the carcass
- ⑳ Final trimming → remove pieces of membranes and arteries from the inside neck area and remove spinal cord.
- ㉑ Weighting and tagging

(24)

3

Emergency Slaughter unit (Isolation block)

- Considered very small abattoir with a Lairage for up to 4 Cattle, slaughterhall and hanging room intended for slaughtering the suspect animals.
- Should be situated near to the detained meat room and in direct communication with the by-products department.
- Isolation block in which diseased or suspect animals must be segregated and Lairaged.

4

CarCass Coolers (chilling room)

- CarCasses must be quickly chilled and placed in adequately refrigerated and conveniently located rooms.
- unchilled CarCasses must not be placed with chilled CarCasses.
- The chill capacity must be related to the slaughter capacity of the plant.
- ALL CarCasses must be effectively and evenly chilled and their surfaces dried.

• chilling of meat is conducted to:

1. Limit bacterial growth
2. Facilitate normal post-mortem processes in the meat.

• Chill Coolers should be maintained at 2°C

in order to achieve proper cooling \rightarrow the internal temp. (at the bone in the deep musculature) should be brought to 4°C within a minimum period of time.

• avoid Condensation on the Carcass surfaces during chilling as it can enable bacteria to grow.

• Condensate from chiller/blower and rail lubricants must not drip on Carcasses.

• Effective sealing of the chiller doors:

1. help maintenance of correct temperature.
2. \downarrow moisture Condensation from warm outside air on the Carcass surfaces.

• Recommended cooler rail heights:

Spp	Minimum height From top of rail to Floor	Maximum distance From top of rail to shackle contact point	Minimum Spacing From walls, pillars, etc.
cattle	3.1 m	30 cm	60 cm
calves	2.4 m	30 cm	60 cm
sheep and goats	2.0 m	30 cm	60 cm

5 offal coolers

must be provided to ↓ the internal temp. of offal to 4°C or Lower as quickly as possible after evisceration.

6 Freezer rooms

- all sharp freezers should be refrigerated at temp. of -30°C or Lower and holding freezers at -18°C or Lower.
- all freezer rooms used for the destruction of trichina must be equipped with locked thermographs and facilities.

7 Detained meat room

- In which CarCasses and organs are detained for further examination.
- should be located adjacent to the slaughter hall inspection point.
- From this room the overhead rail reconnect with the main slaughter Line for direction of detainee CarCasses either to the chill rooms or to the condemned meat room.

- must be adjacent to the abattoir Laboratory
→ For microbiological, pathological and parasitological examinations as well as photography.
- The Carcasses should be chilled if held for a long period (for example awaiting Lab. examination)
- Facilities of good drainage, easily cleaned surfaces and adequate sterilization should be maintained.
- Should be lockable ^{مقفولة} and its entry is restricted to authorized personnel.

Abattoir

8

Condemned meat room

- For keeping meat inspected and judged as unfit for human consumption before transferring to the by-products unit or removal.
- must have a lockable door.

9

Hide and skin store

must be in the inedible section with only minimum connection to the remainder of the plant.

- ♦ Must be properly ventilated → so that they do not affect the air quality entering other areas of the plant.
- ♦ Shipment must be by direct access to the inedible Loading.
- ♦ Hides must not pass through other storage areas.
- ♦ Salt bins and facilities for curing hides should adjoin the hide room.

611

10 Gut and tripe room

- ♦ To which stomachs and intestines are transferred by mechanical equipment (moving-top tables) or by a suitable gradient, where they separated and emptied.
- ♦ Subsequent processing of stomachs and intestines should take place in a separate unit.

11 offal room

Where edible offals such as livers, lungs, hearts and kidneys are trimmed, placed and stored at chilling temp. (not exceed 3°C)

12

Edible Fat room

- for holding the edible fat awaiting dispatch.
- situated near the gut and tripe room.

13

processing rooms

- Lighting, Ventilation, temp. control and freedom from steam and Condensation are essential to the sanitary production of prepared meat products.
- must be maintained at a temp. not exceed 10°C except those used for cooking, preparation of meat products prior to cooking or handling stable food products.
- Hand Lavatories and Wash tanks that use stagnant water are prohibited.
- ALL meat production equipment must be dismantled and thoroughly cleaned daily.

14

Cutting and Boning Rooms

- must meet all structural, equipment and operational requirements.
- should be kept at a temp. of 10°C or lower.

- adequate No. of Knife Sanitizers must be provided.
- these areas involve extensive meat handling
 → resulting in microbial cross-contamination
 → So, meat leaving these areas carries higher Level of bacteria than meat in the chiller areas.

15 packaging, shipping and receiving rooms

- For packaging, shipping and receiving fresh and cured meat products.
- must be kept at a constant temp. not exceed 10°C.
- Edible shipping and receiving areas should be refrigerated.
- Meat products must be handled in a sanitary manner.

16 Dry Storage rooms

- must be maintained in a clean and sanitary condition.
- wrapping materials used to package meat products must be kept in a sanitary condition.
- all packaging materials, containers and labels bearing the meat inspection Legend must be kept in a separate room (bond room) with security maintained by management.

17

Inedible area

Materials unfit for human consumption (except hides and skins as well as the condemned parts) should be sited away from edible areas.

18

Fresh meat dispatch area

must be sited away from the dirty parts of abattoir and easily reached by vehicles that transport meat and offal for human consumption.

19

Staff rooms

should be located to meet the needs of the plant, employees and plant hygiene.

Employee Washrooms should only be accessible from plant production areas through a hallway.

g. Washrooms:

→ Constructed of smooth, hard, impervious material such as glazed tile or steel with properly drained floors and adequate size for the maximum No. of employees.

Meat Hygiene

Abnormal and pathological conditions related to meat inspection

2



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لحم الجوز كاس

Fever
- hyperthermia
- hypothermia

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5- Tumours (Neoplasms)

- Common tumours found during beef inspection → squamous cell carcinoma, lymphosarcoma, mesothelioma etc.
- Most of the food animals are slaughtered early in life → so tumour formation is uncommon.

Judgment:

- Single circumscribed benign tumour → only requires condemnation of the affected organ or part.
- Multiple benign tumours in different organs → total condemnation.
- Malignant tumour → divide the carcass into joints → thorough examination for the evidence of secondary growths in organs, muscles, bones and lymph nodes.

6- Emphysema

Def. extension and accumulation of air in tissues

Postmortem findings:

Pulmonary emphysema in old cow (Most popular)

1. Emphysematous lung → pale, enlarged greyish-yellow, pearl like shiny lesion
2. Upon palpation → puffy and crepitant.
3. Lung lobulation → well marked due to accumulation of air in interstitial tissues.

Judgment:

- condemnation of affected lungs.
- Any systemic disease → total condemnation of carcass

7- Poisoning

Plant poisoning

Antemortem findings and gross lesions:

- 1- diarrhea
- 2- bloated abdomen
- 3- heart failure
- 4- Photosensitization
- 5- Necrosis and cirrhosis of liver
- 6- Laminitis
- 7- Nervous manifestation
- 8- sudden death.

Judgment:

Depends on the clinical signs and the extent and severity of the lesions → if signs appear → total condemnation.

Chemical poisoning

Judgment:

- If clinical signs of poisoning are associated with postmortem lesions → Total condemnation
- Clinical signs and degenerative changes → Total condemnation
- In mild cases where there are no degenerative changes, visceral lesions or systemic changes → condemnation of the stomach, intestines, kidneys, liver and udder, while the rest of carcass is released for human consumption.

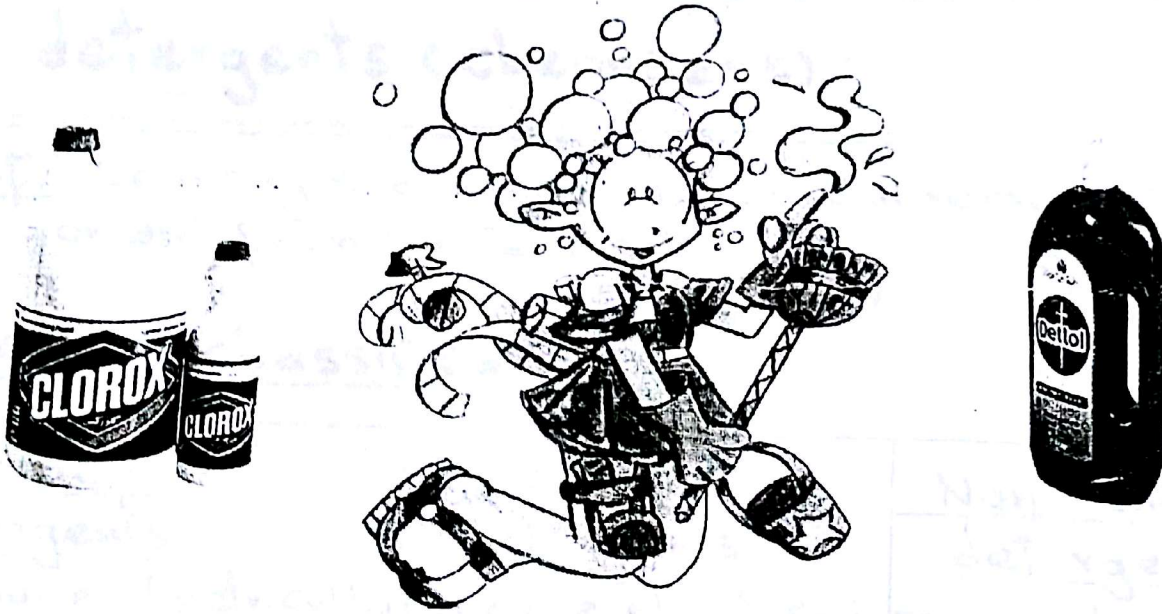
Meat Hygiene

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Abattoir (Slaughterhouse)

[3]

Abattoir Sanitation



أ.د/ خالد سلام

Slaughterhouse sanitation

- Cleaning: physical removal of soil e.g dirt, food residue or grease.
- disinfection: reduction of pathogenic M.O to safe levels.
- disinfectant (sanitizer): a chemical that is lethal to microbes

General considerations should be adapted in Slaughterhouse Sanitation

A Detergents (cleansers):

def. Cleansing substances which can remove soil or dirt from surfaces.

Chemical classification:

Anionic detergents

produce electrically +ve ions in soln.

- e.g Soap and most synthetic detergents
- It is the preferable group.

Cationic detergents

produce electrically -ve ions in soln.

- has a good wetting, foaming and emulsifying properties.

Non-ionic detergents

produce electrically neutral ions in solutions.

a) Halogen-based Compounds:

• Examples → Chlorine, Iodine, Fluorine

• Mode of action:

release free chlorine radicals as the active agent which react with cell wall constituents of M.O and food residues.

• adv.:

1. Non-tainting
2. biodegrade into non-toxic compounds.
3. Can be detected using a simple chemical test kit.

• disadv.:

1. Limited stability
2. Inactivated in the presence of organic material e.g food residues.

b) Quaternary ammonium Compounds:

• Mode of action:

act by damaging the cytoplasmic membrane of cells in the residue.

- act against fungi, amoeba and enveloped viruses.
- Lethal to a wide variety of organisms except endospores, T.B, non-enveloped viruses and pseudomonas spp.

• adv. :

1. Non-toxic
2. biodegradable
3. Can be detected using a chemical test kit.
4. Very effective in combination with phenols.

• disadv. :

1. Inactivated in the presence of organic material.
2. Inactivated by excessive Lime in hard water.
3. Inactivated by soaps and other anionic detergents.

• Effective Levels → 200 ppm

• Effective at temp. up to 100°C

© Amphoteric Compounds :

• def.

Substances capable of acting either as acids or as bases depending on the reaction in which they are involved.

• Example : aluminum hydroxide, $\text{Al}(\text{OH})_3$

• adv. :

1. Non tainting
2. stable
3. biodegradable
4. Low toxicity
5. Can be detected chemically

- 6- Compatible with other detergent and sanitizer.
- 7- unaffected by hard water.

• disadv.:

require a long contact time to complete their function.

④ Acids and alkalis:

• Mode of action:

act by oxidizing the proteins in the cells of M.O and the residue.

• Examples:

Strong mineral acids and caustic alkalis

• adv.:

- 1- Non tainting
- 2- Non-toxic
- 3- biodegradable
- 4- Can be detected chemically.

• disadv.:

- 1- Fairly stable
- 2- Corrosive in Concentrate form.
- 3- Never used in conjunction with halogen-based compounds → as this would liberate chlorine gas which is highly toxic.

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Meat Hygiene

لحم الخنزير البائع

Preslaughter Care



أ.د/ خالد سلام

Influence of stress reaction on meat quality:
Meat quality is mainly associated with Level of glycogen, Lactic acid, temp. and stress seriously affects these parameters:

1. PSE and DFD meat
2. higher pH and poor keeping quality of the meat.
3. ILL-bled meat
4. \uparrow initial microbial content of meat.

② Mortality in transit:

- occur mainly in pigs and poultry
- Ruminants are generally more resistant.
- Higher mortality occur in:
 1. the summer months.
 2. Long journeys \rightarrow the relation
- average mortalities in transit in UK are about:
 - \rightarrow 0.1% For pigs
 - \rightarrow 0.02% For sheep
 - \rightarrow 0.2% in broiler chickens

③ The spread of diseases:

- Movement of animals from farm to slaughter has effects on the spread of disease esp. if they pass through one or more markets.
- stress associated with handling and transport \rightarrow \downarrow immunity \rightarrow \uparrow A' susceptibility to infection.

Meat Hygiene

Emergency Slaughter



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Casualty and Emergency Slaughter

- It is important to subject the Carcass of animals that have undergone emergency slaughter to a careful and critical inspection.
- The danger from meat of emergency-slaughtered animals when compared with those slaughtered commercially, was:
 - 80 times greater in cattle
 - 100 times in sheep
 - 12 times in calves
 - 200 times in pig
 - 3 times in horse

Casualty.

closed slaughter:

a type of slaughter authorized under special precautions for a defined group of animals, ordered by animal health authorities (Notifiable diseases). during this time other animals must not be slaughtered.

Casualty Slaughter:

the situation where an animal is not in acute pain or immediate danger of death but affected with a more chronic condition e.g. obturator ^{nerve} paralysis, following milk fever in the cow. It requires bacteriological and residue testing.

① chemical residue testing

The owner has to Certify that:
he has not given any treatment other than
prescribed by the Veterinary Surgeon or if
other treatment has been given, the name
of the Compound and date of the Last
treatment.

Categories of animal for emergency, slaughter:

→ Sick; injured or dead animal may be conveyed
to an abattoir under one of the following 3
Conditions:

- the animal may arrive alive but in a moribund state
- The animal may arrive slaughtered and unviscerated
- The animal may arrive in the form of dressed carcass (slaughtered and eviscerated)

1) animal may arrive alive but in a moribund state:

- Cattle and sheep in moribund condition usually stiffen immediately after slaughter (suffered from GIT disorders and have been generously dosed with medicine)
- The animal is allowed to slaughter and the blood is observed → In very severe injuries or bruising, the blood has a thicker

Judgement:

- generally, emergency-slaughtered animals
→ may pass for human consumption only where:
 - 1- It shows no evidence of disease
 - 2- has a negative bacteriological and residue test.
 - 3- It bled and set well.
 - 4- It looks normal in every way.
- postmortem discoloration, contamination or decomposition → the carcass should unhesitatingly be condemned.

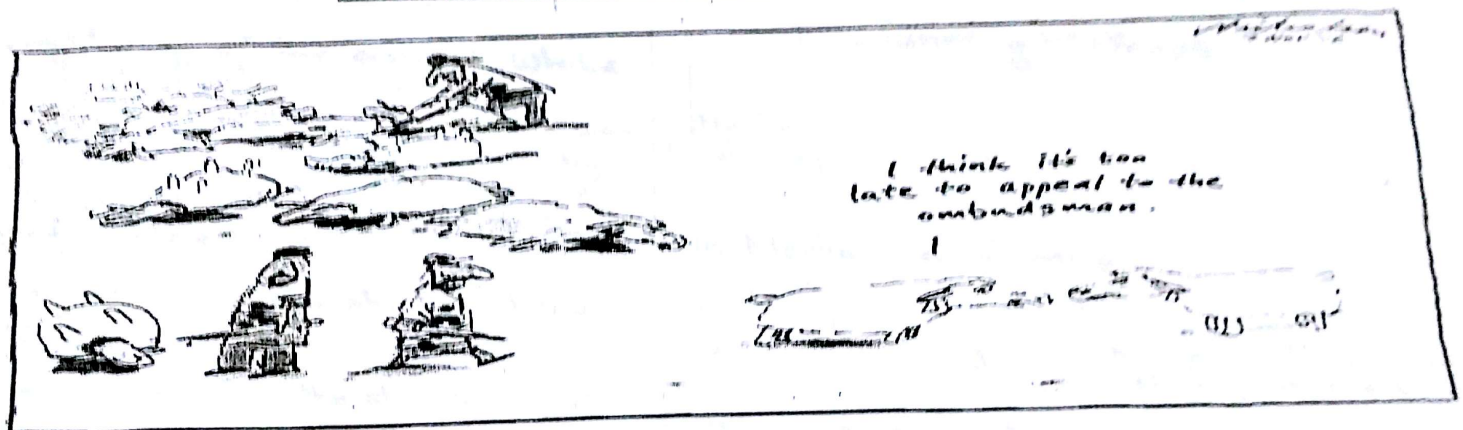
any doubt about the meat suitability as Food, the consumer must always be given the benefit of the doubt.

- The ultimate aim of veterinary antemortem inspection should be the acceptance of only normal animals for slaughter except casualty/emergency slaughter cases consigned under a veterinary certificate.

Meat Hygiene

Slaughter methods of **Meat Animals**

22
17
A/2



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سلاخه Slaughter methods of meat animals

There are 2 main methods for slaughtering:

Slaughtering of the animal while being unconscious

Slaughtering of the animal while being conscious (Ritual/Religious slaughter)

I Slaughtering of the animal while being unconscious

Animals should be rendered unconscious by stunning (except in ritual slaughter) and then killed by bleeding (In Europe and most developed countries).

animal awaiting slaughter should not view the slaughtering process.

ALL persons engaged in the slaughtering of animals in a slaughterhouse must have a license granted by the local authority → this license is renewable annually and granted only to persons over 18 years of age who are fit to do the job.

Every effort must be made to ↓ the stress on the animal prior to slaughter.

①

slaughter animals should be properly restrained before stunning or bleeding.

stunning box is the most common method of restraining cattle.

Stunning Methods

Mechanical stunning

Electrical stunning

CO₂ stunning

A Mechanical stunning:

penetrative stunning

Non-penetrative stunning (Knockout)

1-penetrative stunning:

a-penetrative captive bolt pistol:

- A bolt attached to the pistol is propelled and automatically recoils into the barrel.
- bolts with sharp ends penetrate the front of the animal head.

②

Effect of stunning on meat quality:

- ① Blood splashing in muscles: due to
• penetrative percussive stunning (captive bolt)
due to long interval between stunning and sticking.
• Inadequate penetration of the bolt.
• Head-only electrical stunning in sheep.

② CO₂ stunning:

produce the lowest incidence of PSE and blood splash.

pithing:

Slaughtering technique in which the brain of the animal is destroyed by a tool called pithing rod or cane.

- pithing rod should not be longer than 60 cm
→ to avoid destruction of the spinal cord roots of greater splanchnic nerve (the main vasoconstrictor of the abd. cavity) →
dilatation of splanchnic bl. vs → Congestion of Liver, Kidneys, Intestines and Spleen (slaughter spleen).

⑦

II Slaughtering of the animal while being conscious (Ritual / religious slaughter)

① Jewish method of slaughter (shechita):

- at the time of slaughter, animals must be healthy and not suffer from any form of injury
- any form of stunning is prohibited
- animals slaughtered acc. to Jewish faith are cattle, calves, sheep, goats, deer and poultry but not pork (prohibited).
- A special appointed member of the Jewish faith is only allowed for slaughter.
- The slaughter process called shechita only done by the cutter (shochet) assisted by a sealer (shomer) who stamps the Kosher mark on the carcass and edible offal.
- Kosher → Slaughtered animals fit for Jewish consumption.
- Terepha → Food unfit for Jewish consumption.

⑧

Kosher dietary Laws:

deal with 3 issues:

- ① The allowed animals
- ② The prohibition of blood
- ③ The prohibition of mixing of milk and meat.

allowed animals (Kosher):

- ① Ruminants with split hoofs that chew their cud.
- ② The traditional domestic birds (chicken, turkey, quail, duck and goose)
- ③ Fish with fins and removable scales.

prohibited animals:

- ① pigs
- ② Wild birds
- ③ Birds in the rathrie category (ostrich, emu and rhea) → ostrich is prohibited in the Bible
- ④ sharks, dogfish, catfish and monkfish
- ⑤ all Crustacean and molluscan shellfish.
- ⑥ almost all insects

act of Slaughter:

1. The animal is slaughtered with a single swift action of a razor-sharp knife
 - Its length is twice the width of the animal neck.
 - devoid of any notch or fault.
 - Examined before the slaughter of each animal.

9

2. The neck is fully extended and all the soft tissues anterior to the cervical spine are severed including skin, trachea, carotid Ar and jugular veins.

3. The five principles of Jewish ritual slaughter.
→ The neck incision must be completed by one rapid thrust under pressure without pause, pressure, stabbing, slanting or tearing.

Searching:

When the diaphragm is exposed during carcass dressing → the shochet perforate it and examine the thoracic organs.

- any adhesions of the lung found, are examined visually and if appear to be harmful the animal when it was alive → The carcass is pronounced unfit for Jewish consumption (Terefa).

- Carcass must be washed with water and blood → further washing and curing or broiling carried out at home.
- Fit Carcasses (Kosher) must have the pores purged by removal of large blood vessels.

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For this reason, The forequarters which are porged, are normally eaten by Jews. The hindquarters (contain over 50 bl. vs) and so difficult to be porged, are seldom eaten by them but are sold to non-Jewish population.

* Kosher meat must be used/sold within 3 days after slaughter.

② Muslim method of slaughter (blessing)

called Islamic, Mohammedan or Halal method.

* Islamic jurisprudence (Sharia, الشريعة الإسلامية) specifies which foods are Halal (Lawful) and which are haram (unlawful). This is derived from Commandments found in the Qur'an as well as the Hadith and Sunnah.

acc. to the Qur'an, The only foods forbidden are:

- 1. Carrion (CarCass of animals that die of themselves)
- 2. Blood
- 3. Meat of swine (pigs)
- 4. animals dedicated to other than God (either undedicated or dedicated to Idols)

(11)

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ وَلَمْ يَمْنَحِ الْمَيْتَةَ وَاللَّهُ يَخْتَارُ مَا يَلِيقُ بِهِ وَيُخَيِّرُ اللَّهُ لِقَيْنِ اضْطَرُّوا لَمْ يَمْنَحِ وَلَا عَادَ فَلَا رَيْبَ عَلَيْهِ إِنَّ اللَّهَ عَلِيمٌ ذَكِيمٌ

⑤ an animal that has been strangled/asphyxiated, beaten (to death), killed by a fall, or a horn butted animal (to death), Salvaged by a beast of prey (except by a human)

«خُرُجَتْ عَلَيْهِمُ الْمَيْتَةُ وَاللَّهُمَّ وَالْحَمْدُ الْخَيْرُ بِهِ وَمَا أَلَمَ يَنْفِرَ اللَّهُ بِهِ وَالْمُخَيَّرَةُ وَالْمُؤَلَّوَةُ وَالْمُفْرَقَةُ وَالْمُطَيَّرَةُ وَمَا أَلَمَ الْمَيْتَةُ إِلَّا مَا تُخَيَّرُ وَمَا يَبِيعُ عَلَى النَّفْسِ وَأَنْ تَسْتَقْبِلُوا بِالْأَنْ لَا يَكُنْ لَكُمْ لَيْسَتْ»

⑥ Food over which ALLah's name is not pronounced. (وَلَا تَأْكُلُوا مِمَّا لَمْ يُذَكِّرْ اللَّهُ عَلَيْهِ وَإِنَّهُ لَيَفْقَهُ)

«اليوم احل لكم الطيبات و طعمم الذين اوتوا الكتاب حل لكم و طعممكم حل لهم»

prohibited and permitted animals:

• prohibited animals:

1. Meat of pigs (swine) → strictly prohibit
2. Carnivorous animals Like Lions, tigers, cheetahs, cats, dogs and Wolves.
3. birds of prey Like eagles, falcons, os Kites and vultures.

• permitted animals:

1. Meat of domesticated animals Like rum with split hoof e.g cattle, sheep, goat, and buffaloes.

(12)

Islamic regulations for the slaughter:

- 1- The act of cutting skin with a sharp knife is regarding painless and the rapid loss of blood is said to produce immediate insensibility.
- 2- Islamic Law demands that the animal is alive at the time of slaughter and that it is slaughtered in a humane manner.

من رسول الله صلى الله عليه وسلم إلى
 "إن الله كتب الإحسان على كل شيء فإذا قتلتم فأحسنوا القتلة وإذا ذبحتم فأحسنوا الذبحة وأبوح
 أحسنكم شفرته وأبوح ذبحة"
 رواه مسلم

دifferences between Muslim and Jewish method of slaughter:

- ① Muslim method of slaughter is not controlled by a central board as shechita (any adult man or woman can perform slaughter)
- ② The name of ALLAH must be mentioned at the act of slaughter (Bism Allah, Allah AKbar)
- ③ stunning with electricity or non-penetrative percussive stunning (captive bolt pistol) prior slaughter can be permitted provided that the heart is still beating and the A can walk again after a while if not slaughtered.

(15)

⑤ no restriction of

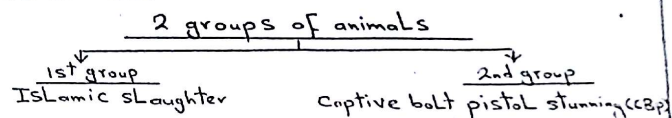
④ There is no searching or paring after slaughter.

→ approved meat for Muslim consumption has no restriction like removal of BLVs or rejecting carcass with lung adhesion. also, both fore- and hindquarters are eaten.

Which is more humane, Ritual or Western method of slaughter? exam

The result of a study carried out by prof. Wilhelm Schulze and Dr. Hazim (Hannover uni. Germany) concluded that:

- Islamic slaughtering is the most humane method of slaughter.
- Captive bolt stunning causes severe pain to the animal.

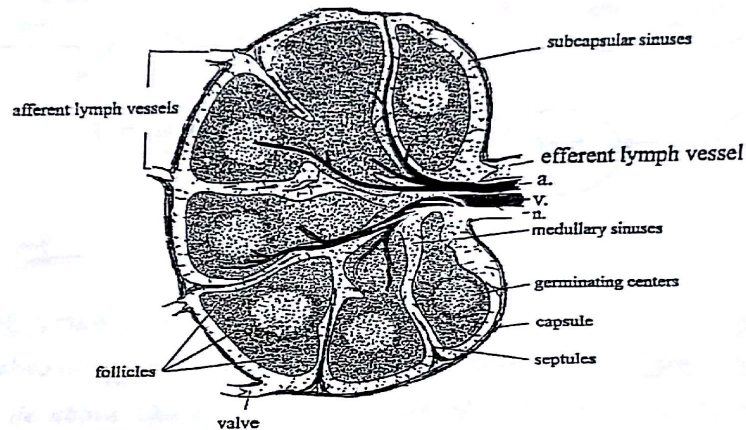


→ during the experiment, an electroencephalograph (EEG) and an electrocardiograph (ECG) recorded the condition of the brain and the heart of all animals during the course of slaughter and stunning.

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Meat Hygiene

Lymphatic System



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Anatomical structure of lymph nodes

1- Capsule

smooth, elastic and fibrous

2- Cortical trabeculae

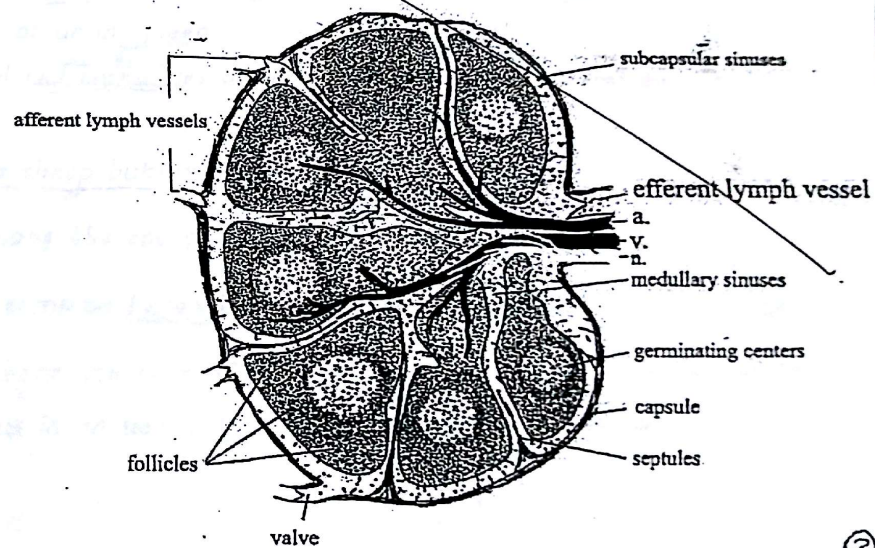
- Acts as filters
- Manufacture of lymphocytes

3- Medullary trabeculae

Are continuous with those of the cortex

4- Hilus

- Fat, blood vessels and lymphatic vessels
- Incision must be away from hilus but in parenchyma as fat cause misdiagnosis with Caseous material

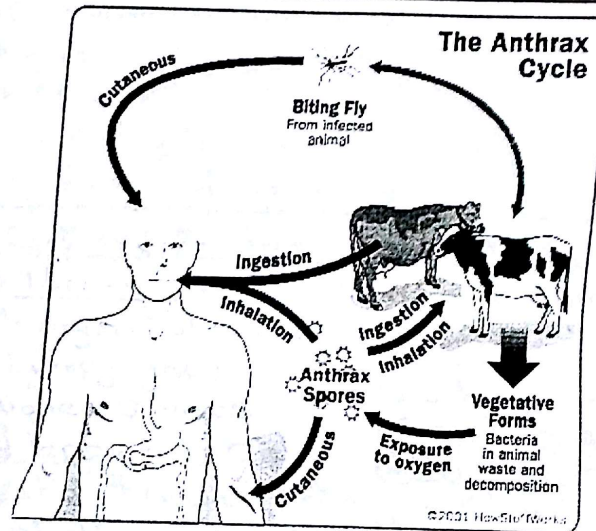


L.n.	P	D	E
<p>① Lumbar L.n. "Master Ln."</p>	<p>→ Situated in the <u>Fat</u> covering the <u>Lumbar muscles</u> and are related anatomically to the aorta and posterior Vena Cava.</p> <p>→ Some are <u>superficial</u>, others being embedded in <u>the loin</u> ^{subcutaneous}</p> <p><u>Suet</u> ^{= lumbar fat}</p> <p>→ Haemal Lns are common in this region.</p>	<p>→ Lumbar region</p> <p>→ Peritoneum</p> <p>→ they receive efferents from the <u>external</u> and <u>internal iliacs</u>, <u>sacral</u> and <u>popliteal</u> Lns</p>	<p><u>Receptaculum chyl.</u></p>
<p>② Renal L.n.</p>	<p>→ Numerous and small</p> <p>→ belong to the lumbar group</p> <p>→ Found in the <u>lumbar suet</u> at the entrance to the <u>Kidney</u>.</p> <p>→ Can be exposed by making an incision <u>2.5 cm deep</u> into the lumbar suet at entrance of kidney</p>	<p>→ Kidneys</p> <p>→ adrenal body</p>	<p><u>Receptaculum chyl.</u></p>

	P	D	E
① Superficial inguinal L.n. (in male)	Lie in the fat mass about the <u>neck of scrotum</u>	external genitals and adjoining skin area	deep inguinal when present or Internal iliac Ln
② Supra-mammary L.n. (in female)	<ul style="list-style-type: none"> • Lie above and behind the udder → they are usually two present on each side, one large (7.5 cm) and one small (0.6 - 1.3 cm) → the small pair found <u>above</u> or <u>in front</u> of the larger pair 	<ul style="list-style-type: none"> → udder → external genitals 	deep inguinal when present or Internal iliac Ln
③ deep Inguinal L.n	<ul style="list-style-type: none"> → In the <u>inguinal canal</u> → <u>Frequently absent</u> → when absent the internal iliac node replaces its function 	<ul style="list-style-type: none"> → Hind Limb → abdominal wall → receive efferent from superficial inguinal L.n (♂) or supra-mammary Lns (♀) 	Internal ILiac L.n
④ Ischiatic L.n	<ul style="list-style-type: none"> Lie on the outer aspect of the <u>Sacro-ischiatic Ligament</u> → exposed by a deep incision on a vertical line midway between the posterior part of the ischium and the sacrum 	<ul style="list-style-type: none"> → posterior pelvic organs → receive efferents from the popliteal node 	Internal ILiac Ln.

Meat Hygiene

Bacterial Diseases



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	actinomycosis (lumpy jaw)	actinobacillosis (wooden tongue)
Def.	chronic, suppurative and granulomatous disease affects <u>bone</u> of cattle and sheep and less commonly horses and man caused by actinomyces bovis	chronic, suppurative condition in which granulomatous lesions are formed in <u>soft tissues</u> of cattle, sheep and horse caused by actinobacillus spp.
antemortem findings	enlargement of mandible or maxilla → at first painless but later become painful and interfere with prehension and mastication leading to digestive upset, diarrhoea and loss of condition
postmortem findings	<ol style="list-style-type: none"> The lesion is confined to the mandible or maxilla which becomes: <ul style="list-style-type: none"> inflamed (osteomyelitis), rarefied and thickened (lumpy jaw) on section, the bone assumes a honey-combed appearance The swelling breaks through the skin and discharge is sticky, honey-like fluid containing fine, firm, yellowish-white granules The regional lns are <u>not</u> involved 	<ol style="list-style-type: none"> Tongue: <ul style="list-style-type: none"> swollen and firm esp. at the base ulcers and granulomas at sides of tongue nodules may rupture to the surface discharging yellowish-green pus containing granular "sulphur bodies" Lymphadenitis of the submaxillary, parotid and retropharyngeal lns. Rumen and Reticulum: <ul style="list-style-type: none"> raised plaques on mucosa with fibrous thickening of the stomach wall → plaques may ulcerate with extension of lesion to liver, oesophagus, diaphragm, peritoneum and lungs peritoneum: cauliflower-like fibrous nodules containing minute yellowish foci Liver: circular lesion Lungs: small to huge irregular lesions containing yellowish green pus in old lesions Skin: sessile fibrous tumors

Condemnation of the affected part while the Carcass is released for human consumption when it is in a good condition

1. affected parts or organs (tongue, Liver, Lungs and stomach) are condemned and the Carcass is approved if there is no evidence of anemia or degenerative changes
2. In case of extensive Lesions → total Condemnation of Carcass

Necrobacillosis

Cause: *Fusobacterium* spp esp. *F. sphaerophorus necrophorus*

Forms of the disease:

- ① oral necrobacillosis (Necrotic stomatitis):
 - occurs mainly in Calves but also in sheep
 - There is ulceration and necrotic diphtheretic membranes in the buccal mucosa, pharynx or Larynx
- ② Foot rot of Cattle, sheep and goats
- ③ Hepatic necrobacillosis (focal necrosis)
 - Most Common in fattening Cattle and Sheep.
 - ch' by multiple abscesses in the Liver which appear early as areas

of Coagulative necrosis while older Lesions may appear as true abscesses
● Lesions are usually pale yellowish in colour about 2-5 cm in diameter

Judgement:

1. When the infection is Local and the Carcass in a good condition → affected parts are condemned and the rest of the Carcass is approved for human consumption
2. If the condition is progressive (toxaemia, septicaemia, pyaemia) or there is emaciation → total Condemnation

②

anthrax

imp

Malignant pustule, splenic fever, wool sorter's disease and Charbon

def. acute or peracute septicaemic disease of animals and man caused by Bacillus anthracis

● The possibility of anthrax occurrence in all cases of sudden or rapid onset of death should be excluded by the examination of blood smear (from ear or tail vein) before opening the carcass → the blood smears are stained with McFadyean's methylene blue → show the anthrax bacilli as large blue organisms surrounded by purple capsular material (McFadyean's reaction)

antemortem Findings:

① peracute form:

1. death without any previous symptoms
2. dark, tarry-like blood which doesn't clot is evident from mouth, nostrils, anus and vulva

② acute form: → Lasts 48 hrs

1. fever, depression, anorexia, rapid respiration
2. diarrhea or dysentery
3. possible abortion
4. Congested M.M

postmortem Findings:

- ① Echymoses throughout body tissues, the blood is dark, tarry and does not clot readily
- ② Engorgement of superficial veins of the skin and muscles giving the carcass a fiery red colour
- ③ very enlarged soft spleen
- ④ Haemorrhagic enteritis
- ⑤ cloudy swelling of heart, liver and kidneys
- ⑥ Rigor mortis is absent or incomplete
- ⑦ Rapid decomposition

judgement:

total condemnation of the carcass, viscera, hide and blood of affected animals as well as for all in-contact animals → because meat from carcasses affected with anthrax is dangerous to man and other animals

procedures must be taken when the anthrax is detected:

- ① anthrax is a notifiable disease, the owner or vet. surgeon should notify the local vet. officer or local police about

existence or suspected existence of the disease.

② When an animal has been died at a Lairage:

- the natural orifices should be packed with a taw or a cotton wool
- the animal's head covered with sacking
- discharged blood should be absorbed with sawdust or earth, all being eventually destroyed by burning

③ opening or moving of carcasses is prohibited

④ detection of anthrax during dressing represents a very serious situation
→ all further dressing and slaughter should be stopped and the affected carcass and contaminated ones as well as offal and blood must be condemned

⑤ condemnation of cases should be done by burning or deep burial along with disinfection

⑥ all equipment (e.g. knives, steels, saws, shovels, etc) involved in the handling of infected material must be either:

- destroyed by burning

- or thoroughly disinfected (e.g. hot 5% Sodium hydroxide or 10% Formaldehyde)

Caseous Lymphadenitis

عرق الغنم

def. It is a chronic contagious disease of sheep and goats caused by → Corynebacterium pseudotuberculosis (ovis)

postmortem findings:

① abscesses in one or more superficial lms, esp. of the head and neck → the abscess contains a greenish-yellow or white, dry pus. affected lms become enlarged.

1. In sheep: the abscess is usually laminated or (onion ring shape)

2. In goats: the pus of the abscess is usually paste-like

② abscesses may develop in lungs, liver, kidneys and brain resulting in emaciation

judgement:

① extensive lesions involving the body or visceral lms either in well-nourished or in poor carcasses → total condemnation

② carcasses associated with systemic changes → total condemnation

③ slightly affected carcasses may be approved for human consumption after removal or condemnation of all affected parts

BruCELLosis

undulant Fever, Contagious abortion, Bang's disease, Malta Fever or Mediterranean Fever)

def. It is a specific contagious disease of cattle, goats, sheep and occasionally horses and man caused by *brucella* spp.

antemortem Findings:

- ① abortion
- ② Retained placenta
- ③ sterility in female
- ④ infection of accessory sex glands with infertility in the male.

postmortem Findings:

- ① placenta is oedematous and reveals yellowish granular necrotic plaques
- ② Fetus is oedematous with
 - blood-stained fluid in body cavities
 - focal necrosis and granuloma in various organs
 - bronchopneumonia
 - sometimes meningitis
- ③ Mammary gland and supramammary lns may be indurated and diffusely inflamed.

- ④ scrotum is enlarged and indurated with formation of fibrous tissue which may compress or replace the testes.

judgement:

genital organs, udder and associated lns of cattle carcasses must be condemned while the carcass is safely released for human consumption.

procedures must be taken at abattoir during slaughtering of brucella reactors:

- ① Hooks should be used to handle uteri and udders
 - uteri and udders must not be incised
 - all uteri and udders from affected and reactor animals must be condemned
- ② Meat inspectors and workers must use:
 - face masks to cover nose and mouth
 - goggles to protect the eyes
 - barrier cream and arm-length gloves

⑤

Clostridial diseases

	Black Leg القصور الوعائي	Malignant oedema
Def.	acute, highly fatal, toxæmic disease of sheep and cattle esp. well-nourished one caused by <i>Clostridium chauvoei</i>	an acute toxæmic disease of cattle, sheep, goats and man caused by <i>Cl. septicum</i>
Antemortem Findings	<ol style="list-style-type: none"> ① affected animal usually found dead ② If the animal found alive, it suffers from: <ul style="list-style-type: none"> ● High temperature ● anorexia and depression ● oedema and crepitation of the affected part which is painful and hot at first but later becomes cold and insensitive ● Lameness may occur 	<ol style="list-style-type: none"> ① rapid onset of death ② Fever ③ anorexia and depression ④ muscle tremors ⑤ Lameness ⑥ soft painful swelling in the subcutaneous tissues
Postmortem Findings	<ol style="list-style-type: none"> ① any muscular part of the body can show lesions including (brisket, shoulder, chest, back, neck, etc.) but in some cases, the heart, tongue and diaphragm alone → show the typical lesion ② affected parts show <u>dark red spongy</u> tissue with <u>bubbles of gas</u>, blood-stained fluid and a rancid odor ③ Lesions vary greatly in size ④ blood-stained fluid and fibrin in the body cavities 	<ol style="list-style-type: none"> ① <u>Blood-stained oedema in subcutaneous and intermuscular connective tissues.</u> → such oedema varies in consistency from a thin yellowish to a thick gelatinous material with a sweetish odour ② affected muscles are dark in colour ③ <u>crepitation due to gas formation is usually absent</u> ④ <u>Blood-stained serous fluid in the body cavities with hemorrhages under serous membranes</u>
Judgement	total condemnation of the affected carcass and viscera (6)	

	Bacillary haemoglobinuria	Infectious necrotic hepatitis (Black disease)	Braxy (Bradsot)
ef.	acute, highly fatal, toxæmic disease of Cattle and Less Commonly Sheep Caused by <u>Cl. haemolyticum</u> (CL. novyi type D)	acute infectious disease of Sheep and Less Commonly Cattle Caused by CL. novyi type B	acute infectious disease of Sheep Caused by CL. Septicum and Ch. by toxæmic abomasitis and high death rate
ante-mortem Findings	<ol style="list-style-type: none"> ① animal may be found dead ② IF animal found alive, it suffers from: <ul style="list-style-type: none"> ● fever, depression ● shallow respiration ● abd. pain, dysentery ● jaundice ● dark red urine 		<ol style="list-style-type: none"> ① Fever ② anorexia ③ depression ④ Recumbency
post-mortem Findings	<ol style="list-style-type: none"> ① anaemia ② subcutaneous oedema ③ Blood-stained FLuid in body Cavities ④ Haemorrhagic enteritis with bloody contents ⑤ Raised anaemic infarcts in the Liver ⑥ Kidneys are pale, friable and showing petechial hemorrhages ⑦ rapid onset of rigor mortis 	<ol style="list-style-type: none"> ① very dark appearance of the inside of skin due to engorgement of the S/C BL. vs ② subcutaneous edema ③ Liver is congested and shows typical lesions of yellowish-grey necrotic areas of about 1-5 cm in diameter surrounded by a red hyperæmic zone. ④ excessive amount of straw-coloured FLuid in the pericardial, peritoneal and thoracic Cavities. ⑤ Hemorrhages on the epicardium and endocardium 	<ol style="list-style-type: none"> ① Inflammation, oedema, necrosis and ulceration of abomasal wall ② enteritis and submucosal hemorrhage in the intestinal wall
Judgement	Total Condemnation of the Carcass and viscera		

ante-mortem Findings	<u>Tetanus (Lockjaw)</u> ^{imp} acute, toxæmic, fatal disease of all mammals esp. sheep and goats caused by <u>CL. tetani</u> ① <u>Spasm of the masseter Mm</u> with difficult prehension, mastication and swallowing (<u>Lockjaw</u>) ② <u>Spasm of the back and neck Mm</u> produce an extension of the head and neck (<u>opisthotonus</u>) ③ <u>Nictating membrane</u> of the eye is prolapsed ④ <u>Tail</u> is stiff and extended ⑤ <u>Ears</u> are erected ⑥ animal becomes very excitable, responding to minor stimuli ⑦ <u>Bloat</u> is apparent in sheep. ⑧ Severe cases end fatally because marked tetanic spasms lead to respiratory and cardiac arrest. <u>postmortem Findings:</u> No significant postmortem lesions <u>Judgement:</u> 1. <u>Total Condemnation</u> on antemortem inspection 2. <u>CarCass and viscera</u> are <u>totally condemned</u> due to: ● imperfect bleeding ● lack of setting ● poor durability ● changes in colour of musculature	<u>Enterotoxaemia</u> Caused by different strains of <u>CL. perfringens</u> . the infection occurs most commonly in well-nourished animals ① <u>Fever</u> , anorexia, depression ② <u>diarrhoea</u> ③ <u>Convulsion</u> , spasm of head and neck which are bend backward (<u>opisthotonus</u>) and staggering gait. <u>postmortem Findings:</u> <u>struck</u> (in sheep), <u>Lamb dysentery</u> , <u>haemorrhagic necrotic enteritis</u> (in Calves) reveal: ① <u>pulmonary oedema</u> ② <u>increased pericardial fluid</u> ③ <u>petechiae</u> on epi- and endocardium ④ <u>enteritis</u> which may be haemorrhagic and ulcerative ⑤ <u>Brain lesion</u> : oedema, haemorrhage and liquefaction <u>pulpy kidney</u> (in Ruminants): Very similar lesions as above beside a characteristic lesion of the kidney which becomes <u>soft and pulpy</u> where the parenchymatous tissue dissolves and leaving only the fibrous matrix. <u>Judgement:</u> total Condemnation of the CarCass and viscera	<u>Bighead in rams</u> acute infectious disease of young rams caused by <u>CL. novyi</u> , <u>C. chauvoei</u> and <u>C. sordelli</u> <u>postmortem Findings:</u> Non-haemorrhagic and non-gaseous oedematous swelling of the head and neck. <u>Judgement:</u> When the infection is localized in the head and neck and the CarCass condition is good, it is partially approved for human consumption → Condemnation of the affected parts and the CarCass is released for human consumption
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Contagious bovine pleuropneumonia

DEF. a very contagious disease of cattle caused by *Mycoplasma mycoides* var. *mycoides*

antemortem Findings:

1-acute Form:

- ① high Fever, anorexia, depression
- ② rapid respiration
- ③ coughing with arched back and extended head
- ④ death may result from fibrinous pneumonia/pleurisy within several days to 1 month

2-chronic Form:

Symptoms of less-intensity and recovery usually occurs after weeks or months

postmortem Findings:

- 1- Serous effusion with fibrous thickening of the pleura and interlobular lung septa (marbled lung)
- 2- pulmonary lobules show either red or grey hepatization of pneumonia.
- 3- pleural adhesion
- 4- clear yellowish fluid in the pleural cavity

judgement:

● animals recovered from the affection may be passed for human consumption after condemnation of the diseased lungs and removal of the inflamed pleura

● IF the carcass is congested or if there is serous infiltration of tissue or emaciation → total condemnation

sheep and goats:

acute septicaemic Form:

- lobar pneumonia of the oedematous lungs.
- Fibrinous exudate in the pleural and pericardial cavities
- petechiae and echymoses throughout the carcass.

systemic Form:

- occurs in lambs up to 1 year of age
- 1- No evidence of pneumonia
 - 2- Haemorrhagic abomasitis with ulceration
 - 3- petechiation of the visceral peritoneum and parietal pleura
 - 4- ulceration in the pharynx and larynx
 - 5- Kidneys may show changes similar to those of pulpy kidney.

judgement:

- acute septicaemic and

systemic Forms

total condemnation

2-chronic Form

→ condemnation of the affected organs and the carcass is released for human consumption

	<u>Colibacillosis</u>	<u>Campylobacteriosis</u>	<u>paratuberculosis (John's dis.)</u>
	an extremely common infectious disease of calves, lambs, kids and foals, caused by several strains of E. coli	gastrointestinal campylobacteriosis → acute zoonotic bacterial gastroenteritis occur in calves, sheep, goat, poultry and man caused by campylobacter jejuni and coli	a chronic infectious disease of cattle, sheep and goats caused by Mycobacterium paratuberculosis <i>Emp</i>
ante-mortem Findings	<u>1-septicaemic colibacillosis</u> <ul style="list-style-type: none"> initial high fever anorexia, depression, weakness diarrhea and dehydration death may occur within 1-4 d. <u>2-enterotoxigenic colibacillosis</u> <ul style="list-style-type: none"> profuse watery to pasty white foul-smelling diarrhea which may contain mucus and/or blood clots depression normal and later subnormal temperature recumbency and death may occur within 12-24 hrs 	1- Watery diarrhea which may be mucoid or bloody 2- anorexia and depression 3- Loss of condition in prolonged cases <u>postmortem Findings:</u> <ol style="list-style-type: none"> Varying degree of enteritis which may be haemorrhagic Mesenteric LNs are enlarged and oedematous Intestinal mucosa is thickened 	1- persistent diarrhea 2- Loss of weight 3- eventual death <u>postmortem Findings:</u> <ol style="list-style-type: none"> Wall of the intestine is grossly thickened with the mucous membrane assuming a corrugated appearance. It looks like the surface of the cerebrum Mesenteric LNs are enlarged and oedematous
post-mortem Findings	<ol style="list-style-type: none"> gastroenteritis which vary in extent and severity subserosal and sub-mucosal haemorrhages there may be pneumonia, arthritis, omphalophlebitis, peritonitis and meningitis 	<u>judgement:</u> Total condemnation of the carcass and viscera because it is a serious form of food poisoning.	<u>judgement:</u> <ol style="list-style-type: none"> If the condition is satisfactory and there are no systemic or degenerative changes → the carcass is approved for human consumption after condemnation of the intestine and mesentery If there is emaciation with serous infiltrations and dampness in thorax and abdomen with lack of setting → the carcass is detained (overnight) in a cool atmosphere → if appearance improves and dryness occurs → the carcass may be safely passed for human consumption otherwise, total condemnation
judgement	total condemnation of carcass and viscera		

Leptospirosis

a Contagious disease of all farm animals and man. Caused by *Leptospira* spp. and ch' by Septicemia, hemoglobinuria, anaemia, jaundice and abortion

post-mortem Findings

- ① anaemia, Icterus and haemoglobinuria
- ② Liver enlargement
- ③ ulceration of abomasum with mucosal haemorrhages
- ④ petechiae in the epicardium and lymph nodes (In case of severe form)
- ⑤ Kidneys: ~~large & white~~ have a mottled appearance due to presence of numerous small red or white infarcts in the cortex (In case of chronic form)

Judgement

1. acute Leptospirosis (septicemic form)
→ total condemnation of the carcass

2. chronic Leptospirosis:

condemnation of the affected organs (Liver, Kidneys, etc.) while the carcass is approved for human consumption

Listeriosis (circling disease)

an infectious disease of cattle, sheep, goats and sometimes horses, birds and man. Caused by

Listeria monocytogenes and characterized by

1. Meningoencephalitis

2. Septicaemia

3. abortion

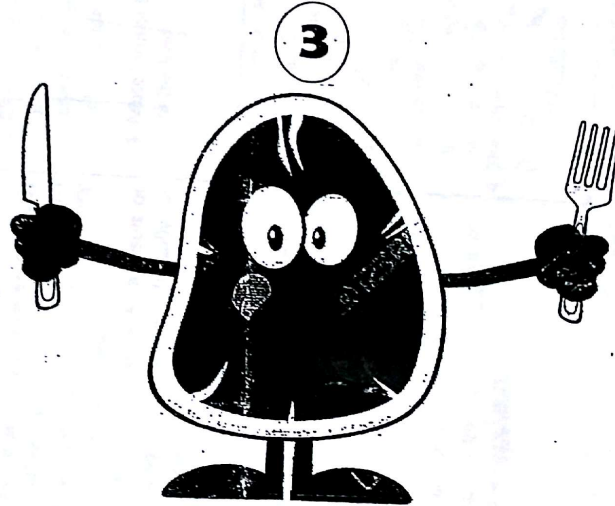
4. sometimes enteritis

Total Condemnation

Meat Hygiene

Abnormal and pathological conditions related to meat inspection

Roana



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CELLULAR DEGENERATIONS AND INFILTRATIONS

1-Fatty change ^{imp}

	Physiological fatty infiltration	Pathological fatty infiltration
Definition	<ul style="list-style-type: none"> • Presence of <u>moderate</u> amount of visible fat in the <u>liver</u>. • Affects chiefly the <u>liver</u>, but also the <u>heart</u> and <u>kidneys</u>. • <u>Conditions and causes</u>: <ol style="list-style-type: none"> 1. ↑ dietary intake of fat. 2. Well-nourished lambs and calves. 3. Very fat aged cows. 4. Advanced pregnancy in cows and ewes. 5. Some animals slaughtered shortly after parturition and often accompany advanced pregnancy in cows and ewes. 6. Sheep slaughtered as a result of pregnancy toxemia (usually in well-nourished ewes). 	<ul style="list-style-type: none"> • Affect <u>liver</u>, <u>kidneys</u> and <u>heart</u>. • <u>Causes</u>: <ol style="list-style-type: none"> 1. Acute febrile and toxemic conditions. 2. Intestinal diseases in cattle. 3. Chemical poisoning → by phosphorus, arsenic, chloroform or carbon tetrachloride. 4. Acute form of bacterial necrosis of the liver.
Postmortem findings	<p><u>The liver appears</u>:</p> <ol style="list-style-type: none"> 1. <u>Larger</u> and <u>heavier</u> than <u>normal</u>. 2. Its edges are <u>rounded</u>. 3. Yellow or <u>yellowish-brown</u> in color. 4. <u>Soft in consistency</u>. 5. <u>Dimples</u> on pressure <u>with fingers</u>. 6. Its capsule → <u>clear and glistening</u>. 7. On section with a <u>knife</u> → the tissue projects <u>beyond</u> the <u>cut edge</u> and has a <u>fatty lustre</u>. 	<ol style="list-style-type: none"> 1. Affected organs are <u>pale</u> in color. 2. <u>In severe cases</u>: The liver and kidneys are <ul style="list-style-type: none"> • <u>pale</u>, <u>clay-red</u> or <u>reddish color</u> • <u>friable</u> • <u>greasy to the touch</u>. 3. The change in color may be <u>uniform</u> or <u>irregular</u> (appears as <u>patchy</u> or <u>spotted appearance</u>). 4. The liver is <u>not</u> <u>enlarged</u>, but <u>shrinks</u> with <u>dull</u>, <u>turgid</u> and <u>wrinkled liver capsule</u>. ^{منقوصه}
Judgment ^{imp}	<ul style="list-style-type: none"> • The affected liver is quite <u>fit</u> for <u>human consumption</u> but it may be <u>condemned on aesthetic grounds</u> → as change in <u>color</u> and <u>consistency</u> made the <u>butchers</u> and <u>consumers</u> think that it is <u>unmarketable</u>. • In <u>less severe cases</u> → the <u>liver</u> may be <u>approved</u>. • In <u>severe cases</u> → the affected organ is <u>condemned</u>. 	<ul style="list-style-type: none"> • The affected organ is <u>condemned</u>. • The carcass is <u>approved</u> if there are <u>no systemic changes otherwise</u>, it is <u>totally condemned</u>.

2. Necrosis

Definition:

death of tissue, organ or part of organ whilst still in the living body.

Causes:

1. occurs as a result of bacterial or toxic action.
2. Arrest of blood or nerve supply to a part of tissue.
3. Pressure from a tumor
4. Mechanical or thermal injuries.

Forms of necrosis:

1. Fat necrosis
2. Liquefactive necrosis
3. Coagulative necrosis
4. Zenker's necrosis in MS
5. Caseous necrosis (Caseation): ^{imp}

Conversion of the firm, dry necrotic tissue ^{necrotic tissue} into a cheesy, pasty mass → composed of fine fat droplets and protein granules with affinity for salts of lime → finally becomes calcified and hard e.g. typical form of tuberculous lesion.

- If the body defensive mechanism is adequate → become encapsulated and calcified.
- If the defensive mechanism is inadequate → caseation is changed to a creamy yellow fluid which is regarded as unfavorable indication, especially in tuberculosis.

Judgment:

- condemnation of affected part or organ
- Thorough inspection of the carcass → if there is generalized disease → total condemnation

3. Gangrene

Definition:

Necrotic tissue becomes invaded by (putrefactive bacteria)

- occurs in tissues liable to contamination i.e. those tissues in contact with the (exterior) e.g. skin, lungs, intestine, vagina and uterus and in those tissues implicated in penetrating wounds.

In meat inspection, it is commonly observed in:

1. Cow's udder following septic mastitis.
2. Lungs of cattle as a result of septic pneumonia following faulty administration of drugs (drenching pneumonia).
3. Reticulum of cattle due to penetration by a foreign body.

Postmortem findings:

1. The affected tissue is

- soft, swollen,
- has a foul smelling odour
- greenish in color → turns to brownish black → As gangrene progresses, the tissues become (livid) (purplish) or greenish and then brownish-black.
- cold and insensitive. (antemortem inspection)

2. Emphysema and foul odor.

Judgment:

- (Gangrene) is a (serious indication in meat inspection).
- condemnation of all gangrenous areas.
- Close inspection of the rest of the carcass for evidence of septicaemic or toxemic infections which if present → total condemnation.
- Very localized gangrene with no evidence of toxemia → partial condemnation.

3. Hemorrhage

Causes:

- 1- trauma
- 2- acute infectious diseases or septicemia.
- 3- ↓ Vit. C
- 4- improper stunning → delay between stunning and sticking of the animal.
- 5- electrical stunning → rapid ↑ in blood pressure leading to hemorrhages in the organs and muscle ("blood splashing").
- 6- stunning of sheep by a mechanical blow to the head → hemorrhage in organs esp. the lungs and heart.

Judgment:

- Minor hemorrhage due to physical causes → carcass is approved
- Condemnation of affected tissue.
- Carcass with extensive hemorrhage where salvaging is impractical ^{اتخاذ} or hemorrhagic carcass associated with septicemia → Total Condemnation

4. Telangiectasis ^{Examination}

(Plum pudding, Cavernous hemangioma)

Definition:

Accumulation of blood in hepatic sinusoids

- A condition occurs in the livers of adult animals of all species esp. in the livers of older cows.

Cause of hepatic telangiectasis in cattle :

- unknown but it thought to be
- 1- local ischemia by neurogenic origin that stimulate the dilation of bl.vs supplying the liver
- 2- Sphaerophorus necrophorus. Bacteria

Postmortem findings:

The liver lesions are

- 1- bluish black ^{الطية}
- 2- irregular with depressed surfaces and dilated blood filled hepatic sinusoids as sponge-like areas
- 3- irregular shape with well-defined edges scattered throughout the liver substances ^{موجوده في الكبد}
- 4- vary in size from 1 – 3 mm and are clearly seen through the serous capsule of the liver.

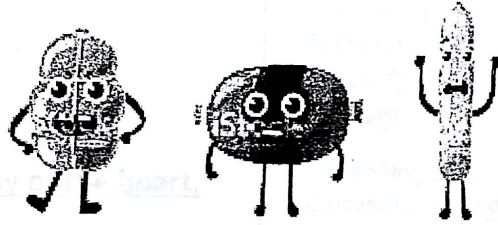
Judgment:

Depends upon the degree of affection.

- 1- Slightly affected liver → approved after appropriate trimmings.
- 2- Extensively affected liver → condemnation.

Meat Hygiene

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Happy Meal

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3. Pyemia

Definition:

pyogenic organisms (i.e. pus-producing organisms) enter the blood stream and form single/multiple abscesses throughout the body.

Antemortem findings:

1. High fever.
1. Presence of local suppuration in:
 - Umbilical region of young calves.
 - Uterus, udder, horn or hoof of old animals.
3. Traumatic pericarditis in cattle.
4. Purulent osteomyelitis.

Postmortem findings:

1. Hemorrhagic infarcts in liver, spleen, kidneys and lungs become purulent rapidly.
2. Local abscesses in the joints and other parts.
2. Acute pyemic infection → septicemic lesions with multiple abscesses at liver, kidney, spleen, lung, joint.

Judgment:

- acute pyemia → total condemnation (no matter what is the cause).
- chronic pyemia where the joints are not involved, abscesses are encapsulated in fibrous tissue, ve bacteriological examination and good bleeding and setting → condemnation of the abscesses with their surrounding tissues, while the carcass pass for human consumption.

4. Toxemia

Definition:

circulation of toxins in the blood stream produced by bacteria.

• The toxins are classified into:

1-Exotoxins: e.g. toxins of *Cl. Tetani*, *Cl. Botulinum* and *Cl. Perfringens*. They are highly active and highly poisonous and produce a specific effect.

2-Endotoxins: less active and less poisonous and not produce a specific effect.

Postmortem findings:

- generalized and systemic effects in the carcass as cloudy swelling and fatty change in liver, kidney and heart.
- In cattle: emphysema of the lungs, marked distension of the gall bladder and enlargement of the lymph nodes.

Judgment: as septicemia → Depends upon the severity of the condition.

5. Abscess

Judgment:

- A single huge abscess found associated with toxemia or pyemia → total condemnation
- Small multiple abscesses in the liver of calves as a result of infection of the umbilicus ("sawdust liver") → Total condemnation
- Multiple abscesses in the liver without infection → condemnation of the organ.
- Single abscess in liver → trimming of affected part of liver.
- Any localized abscess in any organs or parts of body without systemic reaction → condemnation the affected organs and carcass pass.

6. Uremia

Definition:

occurrence of strong urinous or ammoniacal odor in the carcass as a result of an obstruction of normal path of urine.

Causes:

1. Obstruction of the urethra by urinary calculi esp. in bull and ram.
2. Rupture of U.B as due to obstruction of urine flow.
3. Bilateral pyelonephritis or hydronephrosis.

Judgment:

Acc. To severity:

- Severe uremic carcasses → total condemnation
- In borderline cases (slight odor) → the carcass is detained for 24 hours then subjected to boiling test → if a urinous or ammoniacal odor is persisted and detected → total condemnation; otherwise it passes for human consumption.

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